apcd
Louisville Metro
Air Pollution Control District

It All Adds Up:
A Guide to Air Monitoring

METRO Louisville

Presented by
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Federal Monitoring Requirements

- The Clean Air Act requires EPA to:
  - Set national primary and secondary air quality standards (Section 109)
  - Monitor, collect and compile air quality data through a national network (Section 103)
- Federal Regulations establish rules for:
  - National Ambient Air Quality Standards (NAAQS) and Approved Sampling Methods (40 CFR 50)
  - Reference Method Determinations (40 CFR 53)
  - Ambient Air Quality Surveillance (40 CFR 58)

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APCD Monitoring Program

- Operates and maintains the network of ambient air monitoring stations, including a repair shop, a weigh lab, data management, and quality assurance
- Forecasts the Air Quality Index (AQI) and reports actual measurements
- Assists the University of Louisville with air toxics sampling
- Supports EPA's RadNet sampling program to measure radiation
- Collaborates with Indiana and Kentucky on monitoring sites within the metropolitan area

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APCD Monitoring Network

- The objective of the ambient air monitoring network is to determine:
  - The highest concentrations expected to occur in the area
  - Representative concentrations in areas of high population density
  - The impact of significant sources or source categories on ambient pollution levels
  - General background concentration levels
  - The extent of regional pollutant(s) transport
  - Welfare-related impacts in rural and remote areas

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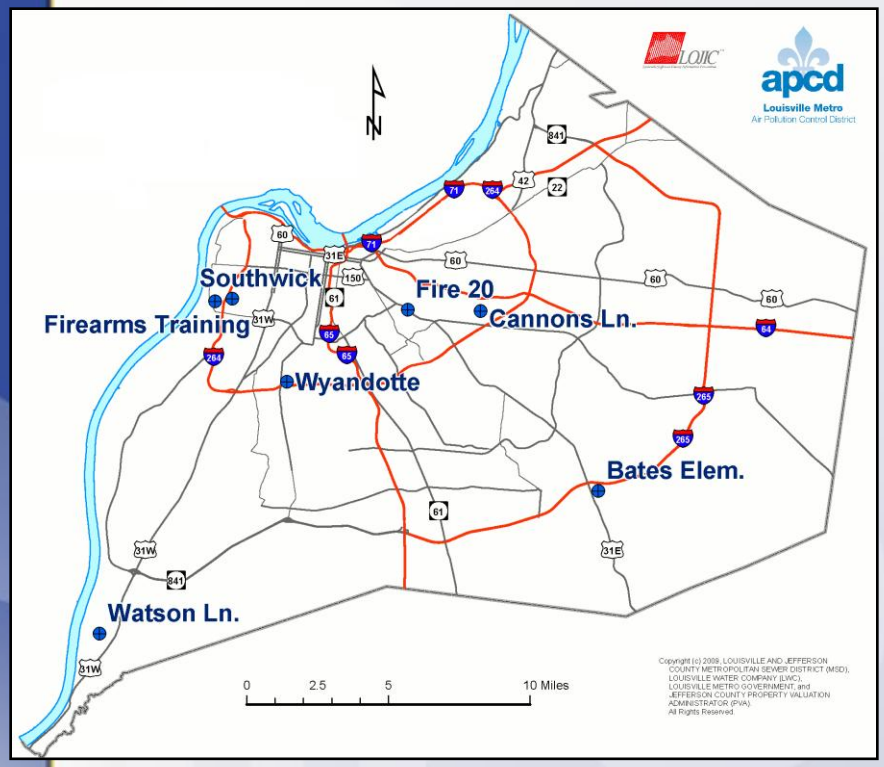
Ambient Air Monitoring Network



- **Bates Elementary**
  7601 Bardstown Road
- **Cannons Lane**
  2730 Cannons Lane
- **Fire Station 20**
  1735 Bardstown Road
- **Firearms Training**
  4201 Algonquin Pkwy
- **Southwick Community Center**
  3621 Southern Avenue
- **Watson Lane Elementary**
  7201 Watson Lane
- **Wyandotte Park**
  1104 Beecher Avenue

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Monitoring Criteria Pollutants

- APCD monitors for 5 criteria pollutants
- Monitoring equipment includes:
  - 3 sulfur dioxide analyzers
  - 2 carbon monoxide analyzers
  - 1 oxides of nitrogen analyzer
  - 3 ozone analyzers
  - 5 Federal Reference Method (FRM) $PM_{2.5}$ samplers
  - 3 continuous PM_{10} samplers
  - 4 continuous $PM_{2.5}$ samplers
  - 1 PM_{10c} sampler

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Additional Data Collection

- $PM_{2.5}$ speciation monitors measure sulfates, nitrates, ammonium, and metals
- $PM_{2.5}$ carbon monitors measures organic and inorganic carbon
- Meteorological instruments measure wind speed and direction, temperature, humidity, barometric pressure, precipitation, and solar radiation
- Radiation monitors use an alpha and beta counting system plus filters to measure isotopes of Plutonium and Uranium (Pu-238, Pu-239, Pu-240, U-234, U-235, U-238)

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National Core Monitoring Station

- NCore is a national network of multi-pollutant monitoring stations
- APCD's NCore site includes monitors for:
  - Ozone
  - Oxides of Nitrogen (NO_x)
  - $PM_{2.5}$ Mass and Speciation
  - PM_{10} – $PM_{2.5}$ (PMCoarse)
  - Trace Level Carbon Monoxide
  - Trace Level Sulfur Dioxide
  - Meteorological data

- Coming soon, monitors for:
  - Total Oxides of Nitrogen (NO_y) in 2010
  - Lead in 2011

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Future Monitoring Needs

- Nitrogen dioxide (NO_2) NAAQS revision requires establishing a near-roadside monitoring site by January 1, 2013
- Sulfur dioxide (SO_2) NAAQS revision (effective August 23, 2010) requires reporting of maximum
  5-minute averages
- Particulate matter (PM), Ozone (O_3), and Carbon monoxide (CO) NAAQS are under review

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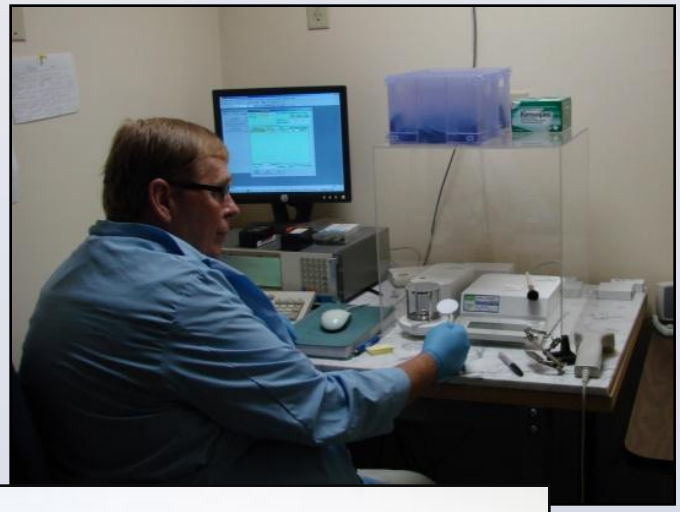
APCD Weigh Lab

- APCD processes $PM_{2.5}$ and PM_{10} samples in our weigh lab
- The weigh lab is a clean room environment that is temperature and humidity controlled
- Approximately 1,200 samples per year are processed



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Air Quality Index

- The Air Quality Index (AQI):
  - Is a standard scale used to report air quality
  - Helps you understand what air quality means to your health
- The AQI is issued hourly and can be found at:
  - http://services.louisvilleky.gov/MetroAirNet/AQI.aspx
  - Or by calling (502) 574-3319

AQI
AIR QUALITY INDEX

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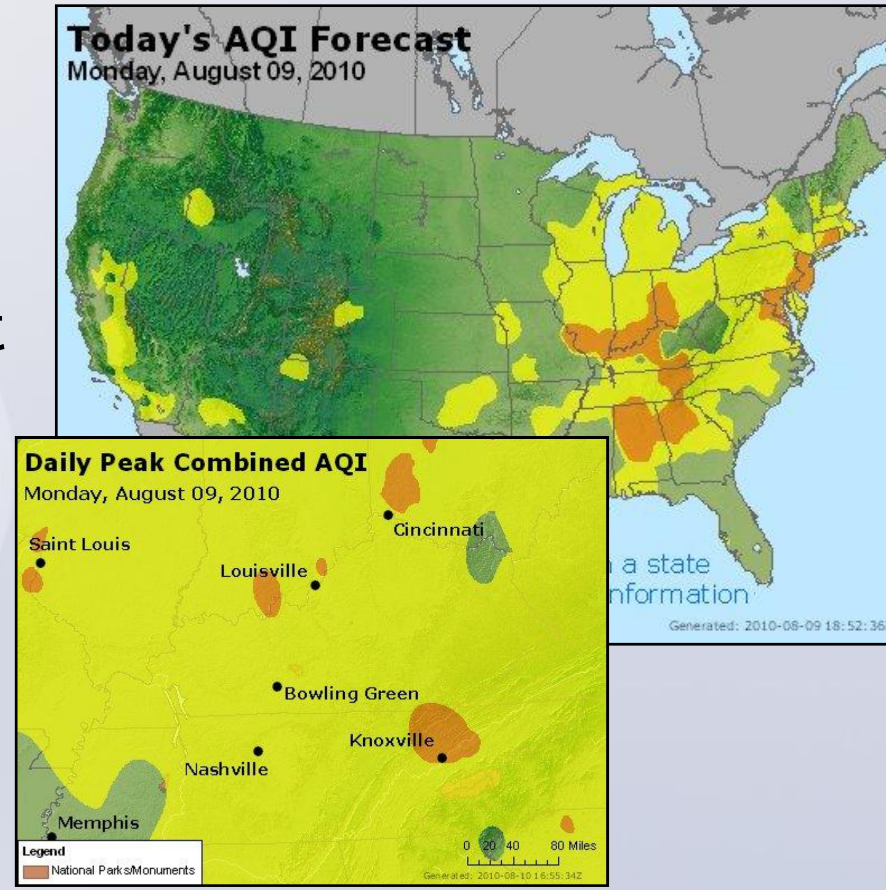
AQI Forecasts

- An AQI forecast is issued daily in collaboration with Indiana and UofL
- Actual AQI values often differ from forecasted values
- AQI Maps can be found at http://www.airnow.gov
- Air Quality Alerts are issued based on the forecasted AQI



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Air Quality Index Levels of Health Concern	Index Value	Meaning
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151-200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201-300	Health alert: everyone may experience more serious health effects.
Hazardous	> 300	Health warnings of emergency conditions. The entire population is more likely to be affected.

Historical Trend of AQI Values

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Summary of AQI
Number of Days in Each Range

2010	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
January	22	9	0	0	0	0
February	16	12	0	0	0	0
March	19	12	0	0	0	0
April	11	15	5	0	0	0
May	9	22	0	0	0	0
June	3	23	4	0	0	0
July	1	23	7	0	0	0

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Measuring Radiation

- EPA's RadNet is a national network of monitoring stations that regularly collect air, precipitation, drinking water, and milk samples for analysis of radioactivity
- The National Air and Radiation Environmental Laboratory (NAREL) oversees RadNet monitoring
- APCD supports RadNet by:
  - collecting and processing air samples
  - providing NAREL real time data 24/7

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Measuring Toxics

- History of Toxics in Louisville
  - 2002 – EPA's *Air Toxics Relative Risk Screening Analysis* identified Jefferson County, KY as having the highest potential adverse impact of toxics in the 8 southeast states
  - 2003 – The West Louisville Air Toxics Study (WLATS) identified 18 chemicals of concern locally
  - 2005 – The Louisville Metro Air Pollution Control Board passes a comprehensive package of regulations, also known as the Strategic Toxic Air Reduction (STAR) Program, to reduce toxic air contaminants
- Although levels of many toxics have decreased, continued concerns in the community have prompted additional monitoring

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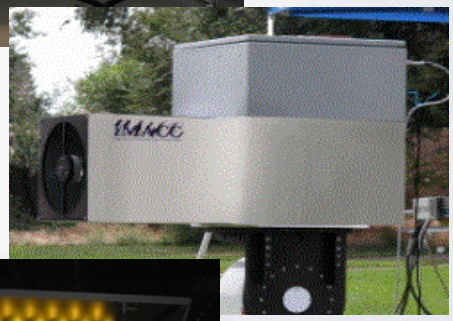
Community-Scale Air Toxics Ambient Monitoring Study



- Received grant from EPA to conduct open-path monitoring of toxics along industrial fence line
- The study focuses on short-term averages over long time periods in locations that are considered to be at a higher risk because of:
  - Proximity to air toxic sources
  - Sensitive populations
- Purchased two instruments
  - Fourier transform infrared spectrometer (FTIR)
  - Ultraviolet-differential optical absorption spectrometer (UV-DOAS)

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Toxics Study Site Selection

Location:	Site Selected to Measure:
Cannons Lane	Urban exposure
Firearms Training	Industrial fence line
Farnsley Middle School	Sensitive population located in an industrial area
Chickasaw Park	Population
Ralph Avenue	Industrial fence line (maximum impact site)
Long Run Park	Background

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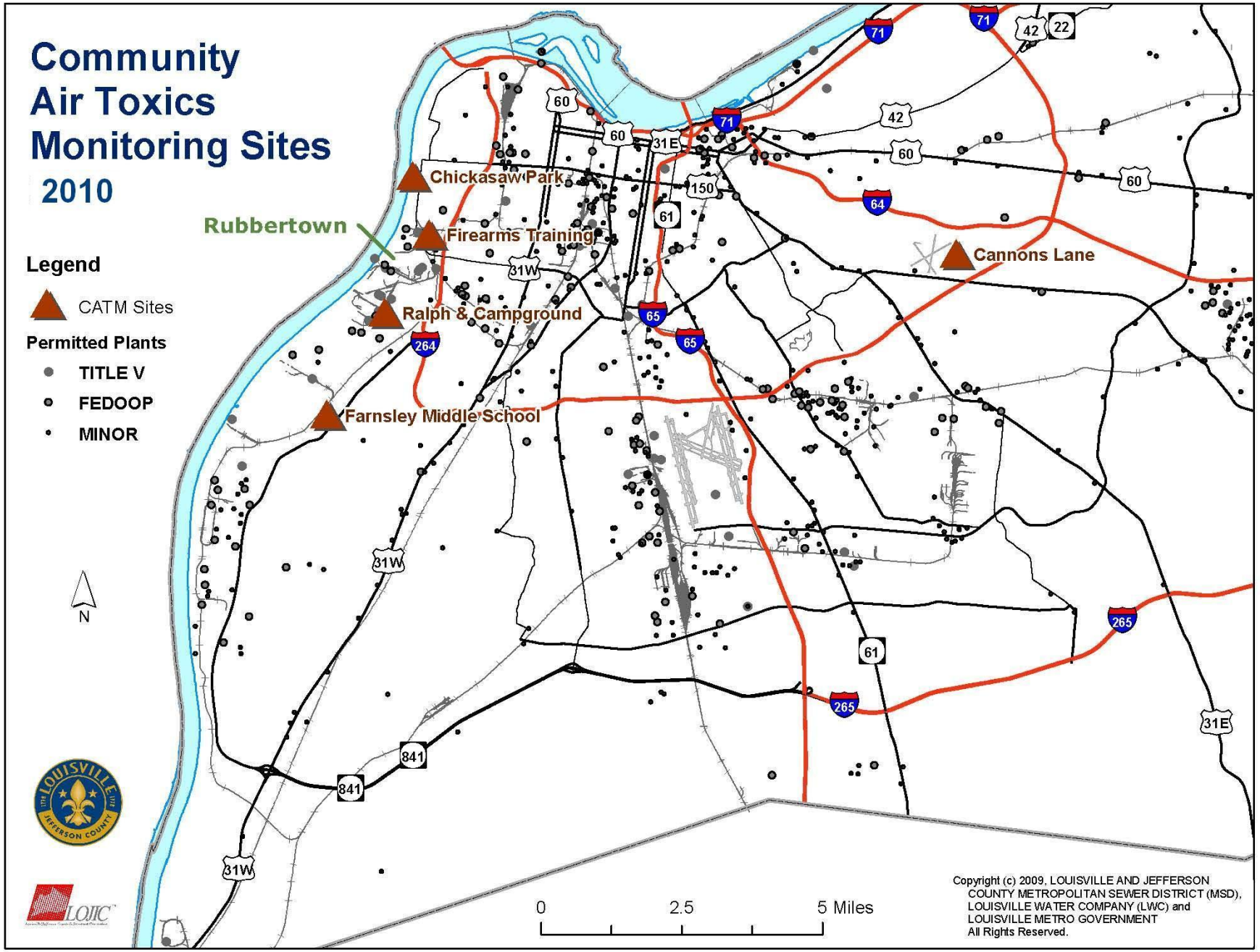
Community Air Toxics Monitoring Sites 2010



Toxics Sites.mxd, 2009-03-24

Toxics Study Timeline

Complete method development at Cannons Lane in 2009

Complete Monitoring Plan and Quality Assurance Project Plan 2010

Complete monitoring at all sites in 2010-2011

Findings and Results in September 2011

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Resources

- APCD Air Quality Info

  http://www.louisvilleky.gov/APCD/ambient
- Kentucky Division for Air Quality

  http://air.ky.gov
- EPA Technology Transfer Network/Ambient Monitoring Technology Center

  http://www.epa.gov/ttn/amtic
- EPA National Air and Radiation Environmental Laboratory

  http://www.epa.gov/narel

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